Metadata model

ECHO has been replaced by the **Common Metadata Repository (CMR)**, a high-performance, high-quality, continuously evolving metadata system that catalogs all data and service metadata records for the EOSDIS system and will be the authoritative management system for all EOSDIS metadata.

The information contained within this ECHO wiki is now archived for historical reference. Please navigate to the **CMR wiki pages**, or to the **CMR Overview page** on **Earthdata**.

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ECHO Metadata constructs

The following three metadata constructs are utilized by the ECHO system:

- **Dataset** - A grouping of science data that all come from the same source, such as a modeling group or institution. Datasets have information that is common across all the granules they contain and a template for describing additional attributes not already part of the metadata model.
- **Granule** - The smallest aggregation of data that can be independently managed (described, inventoried, and retrieved). Granules have their own metadata model and support values associated with the additional attributes defined by the owning dataset.

A dataset within ECHO may contain zero or more granules, however granules cannot exist without being associated to a dataset. Browse images may be associated with either datasets or granules. Browse images may exist in ECHO without an associated dataset or browse, but cannot be discovered in this state. Data Partners should pay close attention to ensure browse image associations are managed closely to

eliminate orphaned browse.

Required & Recommended Elements

This section categorizes a subset of all dataset elements into the following perspectives:

- **Required Fields** – The metadata elements that must be present in order to pass the base XML Schema validation.
- **Recommended Fields** – The metadata elements that we recommend to facilitate searching and data usability by the science community.

The metadata name and description of each metadata field are listed in tabular form, along with the data type and relevant constraints, where applicable. Only the top-level elements of complex metadata elements are listed. Where this occurs, the requisite child element information is inherently required to correctly represent the parent metadata element.
For a full description of the ECHO data model, refer to the schema and documentation referenced on the ECHO Website (http://api.echo.nasa.gov/ingest/).

Datasets

Required Elements

Name	Description
ShortName	This attribute identifies the short name associated with the collection. This is the official reference name used in identifying the contents of the data collection. All characters must be in upper case.
VersionId	This attribute specifies the version identifier of the data collection
InsertTime	This attribute specifies the insert date/time the collection entered the data provider's database. This date is provided by the data provider.
LastUpdate	This attribute specifies the most recent date/time an update occurred in the data provider's database. This date is provided by the data provider.
LongName	This attribute will identify the long name associated with the collection. This is the reference name used in describing the scientific contents of the data collection.
DataSetId	This attribute specifies a unique name for the collection. This information is computed by ECHO according to the data provider's policy.
Description	This attribute identifies the major emphasis of the content of the collection.
Orderable	Deprecated but still mandatory. Use false.
Visible	Deprecated but still mandatory. Use false.

Recommended Elements

Name	Description
ProcessingLevelId	The processing level class contains the level identifier and level description of the dataset.
Price	This attribute specifies the price for ordering the dataset
SpatialKeywords	This attribute specifies a word or phrase that serves to summarize the spatial regions covered by the dataset. It may be repeated if several regions are covered. This often occurs when a dataset is described as covering some large region, and several smaller sub regions within that region.
TemporalKeywords	This attribute specifies a word or phrase that serves to summarize the temporal characteristics referenced in the dataset.
Temporal	This attribute contains records that describe the basis of the time system used for a specific dataset.
Contact	This attribute contains the basic characteristics for a person or an organization type of contact. These contacts may provide information about a Dataset, Delivered Algorithm Package, PGE, or Data Originator. System and user profile contact information is held elsewhere.

ScienceKeywords	This attribute holds a cross reference between datasets and science keywords. The Science Keyword list is managed by the Global Master Change Directory (GCMD).
Platform	This attribute describes the relevant platforms associated with the acquisition of the dataset or granule. Platform types include Spacecraft, Aircraft, Vessel, Buoy, Platform, Station, Network, Human etc.
Instrument	This entity registers the device used to measure or record data, including direct human observation. In cases where instruments have a single sensor or the instrument and sensor are used synonymously (e.g., AVHRR), both the Instrument and Sensor should be recorded. The Sensor information is represented by other entities.
Sensor	This entity holds the referential information for the dataset source/sensor configuration including sensor parameter settings such as technique, etc.
Campaigns	This entity contains attributes describing the scientific endeavor(s) to which the dataset is associated. Scientific endeavors include campaigns, projects, interdisciplinary science investigations, missions, field experiments, etc.
TwoDCoordinateSystem	This entity defines the two dimensional coordinate systems for the dataset. The two dimensional coordinate system information is an alternative way to express spatial coverage. Granules in the dataset that specify two dimensional coordinate data must conform to one of the systems defined by the dataset.
OnlineAccessURL	This entity stores the online URL(s) for the granule, if there any. The URL either provides the site the user can obtain granule data or gives further instructions for obtaining the granule data.
OnlineResource	This entity records the documentation information of the dataset including documentation type and documentation URL where applicable. These resources may include additional subsetting or processing services available for the granule.
AssociatedDIFs	This entity specifies the dataset's Directory Interchange Format (DIF) identifier. The DIF identifier is used to uniquely identify a provider's data set. ECHO coordinates this list with the GCMD portal to facilitate the discovery of datasets through GCMD. Providers may specify their own format, but the following is recommended: <ShortName>_V<Version_ID> (ex: MOD14_V005). Notice that the version id is zero padded to be three digits long.
Spatial	This entity contains the dataset's spatial coverage information.
ArchiveCenter	Center where the dataset is archived.
AdditionalAttributes	This entity stores the product specific attributes (i.e. attributes used to describe the unique characteristics of the dataset which extend beyond those defined in this model).
AssociatedBrowseImages	(deprecated) List of browse images associated with the dataset.

Granules

Required Elements

Name	Description
GranuleUR	The Universal Reference (UR) ID of the granule referred to by the data provider. This ID is unique per data provider.
InsertTime	This attribute is the date/time this granule entered the data provider's database.
LastUpdate	This attribute is the date/time the data provider last updated the granule information in the data provider's database
Dataset	This attribute holds the reference information for a granule to a dataset. The Granule references the dataset either by dataset short name and dataset version or by dataset dataset ID.
Orderable	(deprecated) Use false

Recommended Elements

Name	Description
DataGranule	This entity stores the basic descriptive characteristics associated with a granule.

PGEVersionClass	This entity stores basic descriptive characteristics related to the Program Generation Executable (PGE) associated with a granule.
Temporal	This entity contains records that describe the basis of the time system used for a specific dataset.
Spatial	This entity contains the granule's spatial coverage information.
MeasuredParameters	This attribute specifies the names of the geophysical parameters expressed in the data as well as associated quality flags and quality status. The quality status contains measures of quality for the granule. The parameters used to set these measures are not preset and will be determined by the data producer. Each set of measures can occur many times either for the granule as a whole or for individual parameters. The quality flags contain the science, operational, and automatic quality flags that indicate the overall quality assurance levels of specific parameter values within a granule.
Platform	This attribute describes the relevant platforms associated with the acquisition of the dataset or granule. Platform types include Spacecraft, Aircraft, Vessel, Buoy, Platform, Station, Network, Human, etc.
Instrument	This attribute registers the device used to measure or record data, including direct human observation. In cases where instruments have a single sensor or the instrument and sensor are used synonymously (e.g., AVHRR) both the Instrument and Sensor should be recorded. The Sensor information is represented by other entities.
Sensor	This attribute holds the referential information for the granule source/sensor configuration including sensor parameter settings such as technique, etc.
Campaigns	This entity contains attributes describing the scientific endeavor(s) to which the granules is associated. Scientific endeavors include campaigns, projects, interdisciplinary science investigations, missions, field experiments, etc.
DataFormat	This attribute contains the file format of the raw data (such as HDF) for this granule
TwoDCoordinateSystem	This entity stores the two dimensional coordinate system information for the granule. The two dimensional coordinate system information is an alternative way to express granule's spatial coverage based on a certain two dimensional coordinate system defined by the providers.
Price	This attribute specifies the price of the granule data when ordered.
OnlineAccessURL	This entity stores the online URL(s) for the granule, if any. The URL either provides the site the user can obtain granule data or gives further instructions for obtaining the granule data.
OnlineResource	This entity records the documentation information of the granule including documentation type and documentation URL where applicable. These resources may include additional subsetting or processing services available for the granule.
CloudCover	A percentage value indicating how much of the area of a granule (the ECS data unit) has been obscured by clouds. It is worth noting that there are many different measures of cloud cover within the ECS data holdings and that the cloud cover parameter that is represented in the DataPool is specific to Data Set.
AssociatedBrowseImages	(deprecated) The list of associated browse images to this granule
AdditionalAttributes	This entity stores the Product Specific Attributes with value a granule associates. The attribute name and type must exist in the parent dataset for this granule.

Temporal Data

Temporal metadata refer to the date and time associated with the data represented within a dataset or granule. This is also commonly referred to as acquisition date and time. Temporal data is an essential search criteria for datasets and granules within ECHO. Temporal information is not a required element for datasets or granules. However, if a granule specifies temporal information, the dataset must also. ECHO Ingest will validate that a granule's temporal data falls within the range of its owning dataset's temporal data. If a dataset specifies an open ended temporal range, ECHO will accept all granules that provide temporal data that is subsequent to the dataset's starting date.

Datasets

A dataset may be associated with one or more of the following three types of temporal expressions:

- **Single Date Time** – A single date and time.
- **RangeDateTime** – A date and time range specified by a beginning and ending date and time. An ending date is not required in order

to designate an on-going dataset.
- **PeriodicDateTime** – A repeating date and time range specified by a beginning and ending date and time with a period cycle and duration.

A dataset may provide more than one instance of a single type of temporal expression. For instance, there may be two ranges associated with the dataset signifying that there was a period of time for which no data was collected. ECHO will facilitate discovery of all temporal information, however it will also calculate an internal beginning and ending date/time based upon the least or greatest (respectively) value provided in the list of temporal expressions.
These expressions are used to provide the necessary information in order to uniquely identify the temporal range for which data may be discovered within the dataset. In addition to these items, you may also specify the following items providings users with additional information regarding the temporal specifications of the dataset:

- **TimeType** – The time system which time values found in the temporal ranges represent. (e.g. UTC)
- **DateType** – The type of date represented by the value in the temporal ranges represent. (e.g. Gregorian)
- **TemporalRangeType** – Designates how the temporal coverage is specified. (e.g. Continuous Range)
- **PrecisionofSeconds** – The precision of seconds used in the measurement
- **EndsAtPresent** – Boolean flag denoting that a data dataset which covers, temporally, a discontinuous range, currently ends at the present date. This way, the granules, which comprise the data dataset, that are continuously being added to inventory need not update the data dataset metadata for each one.

Expression of Temporal Information (RangeDateTime)

```
<Temporal>
 <TimeType>UTC</TimeType>
 <DateType>Gregorian</DateType>
 <TemporalRangeType>Continuous Range</TemporalRangeType>
 <PrecisionofSeconds>1</PrecisionofSeconds>
 <EndsatPresentFlag>Y</EndsatPresentFlag>
 <RangeDateTime>
  <BeginningDateTime>1998-01-01T00:00:00.0Z</BeginningDateTime>
 </RangeDateTime>
</Temporal>
```

Granules

A granule may be associated with one of the following two types of temporal expressions:

- **SingleDateTime** – A single date and time.
- **RangeDateTime** – A date and time range specified by a beginning and ending date and time. An ending date is not required in order to designate an on-going granule.

A granule may provide more than one instance of a single type of temporal expression. For instance, there may be two ranges associated with the granule signifying that there was a period of time for which no data was collected. ECHO will facilitate discovery of all temporal information, however it will also calculate an internal beginning and ending date/time based upon the least or greatest (respectively) value provided in the list of temporal expressions.
These expressions are used to provide the necessary information in order to uniquely identify the temporal range for which data in the granule represents.

Expression of Temporal Information (RangeDateTime)

```
<Temporal> <RangeDateTime>
<BeginningDateTime>1998-01-01T00:00:00.0Z</BeginningDateTime>
<EndingDateTime>1998-01-01T00:00:00.0Z</EndingDateTime>
</RangeDateTime> </Temporal>
```

Spatial Data

Cartesian/Geodetic/Orbital Information

For a full description of ECHO spatial representations, please refer to ECHO spatial representations.

Two-Dimensional Coordinate System

In order to facilitate discovery based upon an additional mechanism, a two-dimensional coordinate system may be used. Examples of two-dimensional coordinate system values are path/row for Worldwide Reference System (WRS) data and Moderate Resolution Imaging Spectroradiometer (MODIS) tiles IDs. A dataset must define all two dimensional coordinate systems that granules in that dataset may use. ECHO Ingest will validate that a granule's TwoDCoordinateSystem element references a valid coordinate system defined in the dataset. If the dataset's definition for the coordinate system defines minimum and maximum values for the system axes, ECHO Ingest will validate the granule's metadata against these constraints.

Coordinate System Axis Labels

The ECHO data model does not allow providers to configure axis labels for each TwoDCoordinateSystem. This was chosen to avoid issues where the same coordinate system in two datasets contains different labels for the same axis. This would be a significant issue for ECHO Client Developers. ECHO has chosen to identify the following unique coordinate systems, with the axis labels included below. This listing of labels is recommended for ECHO Client Partners and is used in WIST. If additional coordinate systems are utilized, Data Partners should coordinate with ECHO Operations to ensure that the labeling recommendations are correct.

Coordinate System	X Axis	Y Axis
WRS-1	Path	Row
WRS-2	Path	Row
MISR	Path	Block
MODIS Tile	Horizontal Tile	Vertical Tile
Calipso	Orbit	Path

Datasets

The Two-Dimensional Coordinate System information that exists at the dataset level and contains the following information:

- **TwoDCoordinateSystemName** – The identifying name of the coordinate system
- **Start/EndCoordinate1** – The X' axis coordinate minimum and maximum range values
- **Start/EndCoordinate2** – The Y' axis coordinate minimum and maximum range values

The minimum and maximum range values are not required for both the X' and Y' axes. This allows for finite, infite (in both directions), or no range validation for a specific coordinate system axis. The following example provides a finite range for Coordinate1 and infinite ending for Coordinate 2.

Dataset Two-Dimensional Coordinate System Coordinates

```
<TwoDCoordinateSystem>
 <TwoDCoordinateSystemName>WRS2</TwoDCoordinateSystemName>
  <Coordinate1>
   <MinimumValue>0</MinimumValue>
   <MaximumValue>38</MaximumValue>
  <Coordinate1/>
  <Coordinate2>
   <MinimumValue>0</MinimumValue>
  <Coordinate2/>
</TwoDCoordinateSystem>
```

Granules

The Two-Dimensional Coordinate System information that exists at the granule level and contains the following information:

- **Start/EndCoordinate1** – The X' axis start and end (not required) coordinate values
- **Start/EndCoordinate2** – The Y' axis start and end (not required) coordinate values
- **TwoDCoordinateSystemName** – The identifying name of the coordinate system

Granule Two-Dimensional Coordinate System Coordinates

```
<TwoDCoordinateSystem> <StartCoordinate1>21</StartCoordinate1>
<StartCoordinate2>29</StartCoordinate2>
<EndCoordinate2>33</EndCoordinate2>
<TwoDCoordinateSystemName>WRS2</TwoDCoordinateSystemName>
</TwoDCoordinateSystem>
```

Additional Attributes

Additional attributes are parameters, also known as Provider-Specific Attributes (PSAs), which further describe the data represented in each granule within a dataset. These values are important search criteria for the granules. Example attributes include values for cloud cover, MODIS Tile grid coordinates, and elevation information. All additional attribute definitions are included in the dataset metadata. A dataset may also specify a value, to be understood as the value for all granules. Granules reference defined additional attributes and supply a value that is associated to that granule. Granules may not define a new additional attribute that is not defined by the dataset.
The following table shows the supported additional attribute data types that within ECHO. The XML Type table lists the XML schema type that will be used to validate any attribute values specified in the dataset of granules. The Range Validation column specifies whether range values are allowed at the dataset level, and, if present, whether granules additional attribute values will be validated against the supplied ranges. The *_STRING types allow providers to specify date, time, and datetime attribute values without the associated data validation performed for the pure date and time types.

Attribute Type	XML Type	Range Validation
STRING	string	No
FLOAT	float	Yes
INT	int	Yes
BOOLEAN	boolean	No
DATE	date	Yes
TIME	time	Yes
DATETIME	dateTime	Yes
DATE_STRING	string	No
TIME_STRING	string	No
DATETIME_STRING	string	No

Datasets

An additional attribute, as defined within dataset metadata, must include the following information:

- **Name** – Unique name of the additional attribute.
- **DataType** – Data type of the additional attribute, chosen from the supported list of types.
- **Description** – A textual description of the attribute to help end users understand the purpose and data represented by the attribute.

Your additional attribute definition may also contain the following elements providing additional information:

- **MeasurementResolution** – Identifies the smallest unit increment to which the parameter value is measured.
- **ParameterRangeBegin** – Minimum value of all attribute values that will be provided by the dataset or granules.
- **ParameterRangeEnd** – Maximum value of all attribute values that will be provided by the dataset or granules.
- **ParameterUnitsOfMeasure** – Unit of measure for parameter (e.g. AVHRR: unit of geophysical parameter-units of geophysical

parameter.)

- **ParameterValueAccuracy** – Estimate of the accuracy of the assignment of attribute value. This can be specified in percent or the unit with which the parameter is measured.
- **ValueAccuracyExplanation** – Defines the method used for determining the parameter value accuracy.

As was discussed previously, ECHO Ingest will perform value validation based upon the attribute's data type and range values. See the table in the previous section for more information regarding validation.

Dataset-Level Additional Attributes

```
<AdditionalAttributes>
 <AdditionalAttribute>
  <Name>PROCESSVERSION</Name>
  <DataType>STRING</DataType>
  <Description>foo</Description>
 </AdditionalAttribute>
 <AdditionalAttribute>
  <Name>HORIZONTALTILENUMBER</Name>
  <DataType>INT</DataType>
  <Description>foo</Description>
  <ParameterRangeBegin>1</ParameterRangeBegin>
  <ParameterRangeEnd>100</ParameterRangeEnd>
 </AdditionalAttribute>
</AdditionalAttributes>
```

Granules

An additional attribute, as defined within granule metadata, must include the following information:

- **Name** – Unique name of the additional attribute as defined by the dataset.
- **Values** – One or more values for the additional attribute.

As was discussed previously, ECHO Ingest will validate that an additional attribute with the same name is defiend within the granule's dataset. Also, Ingest may perform value validation based upon the attribute's data type and range values. See the table in the previous section for more information regarding validation. If more than one value is provided, ECHO will preserve the order of the values when queried through the ECHO API.

Granule level additional attributes

```
<AdditionalAttributes>
 <AdditionalAttribute>
  <Name>VERTICALTILENUMBER</Name>
  <Values>
   <Value>12</Value>
  </Values>
 </AdditionalAttribute>
 <AdditionalAttribute>
  <Name>TileID</Name>
  <Values>
   <Value>51013012</Value>
   <Value>51013013</Value>
  </Values>
 </AdditionalAttribute>
</AdditionalAttributes>
```

Platforms, Instruments And Sensors

ECHO adopts a layered representation of platforms, instruments (also known as sources), and sensors in dataset and granule metadata. This layered representation is as follows:

```
Platform->* Instrument->* Sensor
```

All possible platforms, instruments, and sensors that may exist within the granules must be defined with the dataset metadata. A dataset could be associated with zero (0) or more platforms; each platform could contain zero (0) or more instruments, and each instrument could contain zero (0) or more sensors. Each item is uniquely identified by that item's **ShortName** element value. Granules reference defined platform/instrument/sensor combinations associated to that granule. Granules may not define a new platform/instrument/sensor combination that is not defined by the dataset.
The platform, instrument, and sensor must comply with the GCMD standard, located at http://gcmd.gsfc.nasa.gov/Resources/valids/index.html.

Datasets

A platform has the following information that is included in the dataset definition:

- **ShortName** – Unique name of the platform within the dataset.
- **LongName** – The expanded or long name of the platform associated with an instrument. (Required)
- **Type** – The most relevant platform type. (Required)
- **Characteristics** – The characteristics of platform specific attributes. The characteristic names must be unique on this platform; however the names do not have to be unique across platforms.

An instrument has the following information that is included in the dataset definition:

- **ShortName** – Unique name of the platform within the dataset.
- **LongName** – The expanded name of the primary sensory instrument.
- **Technique** - Technique applied for this instrument in the configuration.
- **NumberOfSensors** - Number of sensors used on the instrument when acquire the granule data.
- **Characteristics** - The characteristics of this instrument expressed as custom attributes. The characteristic names must be unique on this instrument; however the names do not have to be unique across instruments.
- **OperationModes** - The operation mode applied on the instrument when acquire the granule data.

A sensor has the following information that is included in the dataset definition:

- **ShortName** – Unique name of the sensor within the dataset.
- **LongName** – The expanded name of the sensor.

- **Technique** - Technique applied for this sensor in the configuration.
- **Characteristics** - The characteristics of this sensor expressed as custom attributes. The characteristic names must be unique on this instrument; however the names do not have to be unique across sensor.

Full Platform/Instrument/Sensor Description

```
<Platform>
 <ShortName>Terra</ShortName>
 <LongName>First EOS Polar Orbiting Satellite, 10:30 AM Descending
Equator Crossing </LongName>
 <Type>Spacecraft</Type>
 <Characteristics>
  <Characteristic>
   <Name>EquatorCrossingTime</Name>
   <Description>Local time of the equator crossing and direction
(ascending or descending)</Description>
   <DataType>varchar</DataType>
   <Unit>Local Mean Time</Unit>
   <Value>10:30, descending</Value>
  </Characteristic>
 </Characteristics>
 <Instruments>
  <Instrument>
   <ShortName>MODIS</ShortName>
   <LongName>Moderate-Resolution Imaging Spectroradiometer</LongName>
   <Technique>Imaging Spectroradiometry</Technique>
   <NumberOfSensors>2</NumberOfSensors>
   <Characteristics />
   <Sensors>
    <Sensor>
     <ShortName>MODIS</ShortName>
     <LongName>Cross-track Scanning Radiometer</LongName>
     <Technique>Radiometry</Technique>
     <Characteristics />
    </Sensor>
   </Sensors>
  </Instrument>
 </Instruments>
</Platform>
```

Granules

A platform has the following information that is included in the granule metadata:

- **ShortName** – Unique name of the platform within the dataset.

An instrument has the following information that is included in the granule metadata:

- **ShortName** – Unique name of the platform within the dataset.
- **Characteristics** - The characteristics of this instrument expressed as custom attributes. The characteristic names must be unique on this instrument; however the names do not have to be unique across instruments.
- **OperationModes** - The operation mode applied on the instrument when acquire the granule data.

A sensor has the following information that is included in the granule metadata:

- **ShortName** – Unique name of the sensor within the dataset.

- **Characteristics** - The characteristics of this sensor expressed as custom attributes. The characteristic names must be unique on this instrument; however the names do not have to be unique across sensor.

As was discussed previously, ECHO Ingest will validate that an additional attribute with the same name is defiend within the granule's dataset. Also, Ingest may perform value validation based upon the attribute's data type and range values. See the table in the previous section for more information regarding validation. If more than one value is provided, ECHO will preserve the order of the values when queried through the ECHO API.

Sources and Sensors

```
<Platform> <ShortName>Terra</ShortName> <Instruments>
<Instrument> <ShortName>MODIS</ShortName> <Sensors>
<Sensor> <ShortName>MODIS</ShortName>
</Sensor> </Sensors>
</Instrument> </Instruments>
</Platform>
```

Measured Parameters

Measured parameters are associated only at the granule level only and are important search criteria for granules. For some providers, the value of certain measured parameters determines the visibility of the granule.
Measured parameters contain the name of the geophysical parameter expressed in the data as well as associated quality flags and quality status. The quality status contains measures of quality for the granule. The parameters used to set these measures are not preset and will be determined by the data producer. Each set of measures can occur many times either for the granule as a whole or for individual parameters. The quality flags contain the science, operational and automatic quality flags that indicate the overall quality assurance levels of specific parameter values within a granule.
A measured parameter is uniquely identified by its **ParameterName** element, and has the following information:

- **QAStats** – The name of the geophysical parameter expressed in the data as well as associated quality flags and quality status
  - **QAPercentMissingData** - Granule level % missing data. This attribute can be repeated for individual parameters within a granule.
  - **QAPercentOutOfBoundsData** – Granule level % out of bounds data. This attribute can be repeated for individual parameters within a granule.
  - **QAPercentInterpolatedData** – Granule level % interpolated data. This attribute can be repeated for individual parameters within a granule.
  - **QAPercentCloudCover** – This attribute is used to characterize the cloud cover amount of a granule. This attribute may be repeated for individual parameters within a granule. (Note - there may be more than one way to define a cloud or it's effects within a product containing several parameters; i.e. this attribute may be parameter specific)
- **QAFlags** – The name of the geophysical parameter expressed in the data as well as associated quality flags and quality status.
  - **AutomaticQualityFlag** – The granule level flag applying generally to the granule and specifically to parameters the granule level. When applied to parameter, the flag refers to the quality of that parameter for the granule (as applicable). The parameters determining whether the flag is set are defined by the developer and documented in the Quality Flag Explanation.
  - **AutomaticQualityFlagExplanation** – A text explanation of the criteria used to set automatic quality flag, including thresholds or other criteria.
  - **OperationalQualityFlag** – The granule level flag applying both generally to a granule and specifically to parameters at the granule level. When applied to parameter, the flag refers to the quality of that parameter for the granule (as applicable). The parameters determining whether the flag is set are defined by the developers and documented in the Operational Quality Flag Explanation.
  - **OperationalQualityFlagExplanation** – A text explanation of the criteria used to set operational quality flag; including thresholds or other criteria.
  - **ScienceQualityFlag** – Granule level flag applying to a granule, and specifically to parameters. When applied to parameter, the flag refers to the quality of that parameter for the granule (as applicable). The parameters determining whether the flag is set are defined by the developers and documented in the Science Quality Flag Explanation.
  - **ScienceQualityFlagExplanation** – A text explanation of the criteria used to set science quality flag; including thresholds or other criteria.

Measured Parameters

```
<MeasuredParameters> <MeasuredParameter>
<ParameterName>Snow_Cover_Daily_Tile</ParameterName> <QAStats>
<QAPercentMissingData>0</QAPercentMissingData>
<QAPercentCloudCover>65</QAPercentCloudCover>
</QAStats> <QAFlags>
<AutomaticQualityFlag>Passed</AutomaticQualityFlag>
<AutomaticQualityFlagExplanation>
No automatic quality assessment done in the PGE
</AutomaticQualityFlagExplanation>
<OperationalQualityFlag>Passed</OperationalQualityFlag>
<OperationalQualityFlagExplanation>
Passed </OperationalQualityFlagExplanation>
<ScienceQualityFlag>Not Investigated</ScienceQualityFlag>
<ScienceQualityFlagExplanation>
See http://landweb.nascom.nasa.gov/cgi-bin/QA_WWW/qaFlagPage.cgi?
sat=terra for the product Science Quality status.
</ScienceQualityFlagExplanation> </QAFlags>
</MeasuredParameter>
</MeasuredParameters>
```

Online Data Access URL And Online Resources URL

For some granules or datasets, the raw data are made available online via FTP or web URL. ECHO stores this online access information for directly accessible granule and dataset data differently from information covering other aspects of granule and dataset data. Directly accessible data require the <OnlineAccessURLs> tag and include the URL to that data. Use OnlineAccessURLs only for the actual data. Online access URLs specified in dataset and granule metadata include the following elements:

- **URL** – URL for the online data. (Required)
- **URLDescription** – Description of the data available via the supplied URL.
- **MimeType** – The mime type of the online data.

Any other online information covering aspects of the data, such as guides, product listings, validation information, etc., should be listed in an <OnlineResources>, along with the URLs to that information. Online resource URLs specified in dataset and granule metadata include the following elements:

- **URL** – URL for the online resource. (Required)
- **URLDescription** – Description of the resource available via the supplied URL.
- **Type** - The type of the resource such as 'Dataset Guide' or 'Campaign Guide' etc. This value should be a short phrase that can be used in an ECHO client for displaying the URL. (Required)
- **MimeType** – The mime type of the online resource

Online Access and Resource URLs

```
<OnlineAccessURLs>
 <OnlineAccessURL>
  <URL>ftp://daac.nasa.gov/granule_1234.zip</URL>
  <URLDescription>Compressed data granule</URLDescription>
  <MimeType>application/zip</MimeType>
 </OnlineAccessURL>
</OnlineAccessURLs>
<OnlineResources>
 <OnlineResource>
  <URL>http://daac.nasa.gov/products/product_A.html</URL>
  <URLDescription>Main product overview page.</URLDescription>
  <Type>Product Overview</Type>
  <MimeType>text/html</MimeType>
 </OnlineResource>
</OnlineResources>
```

Keywords

ECHO supports three kinds of keyword associations for datasets: science keywords, spatial keywords, and temporal keywords. Science keyword and spatial keyword values should come from the Global Change Master Directory (GCMD) keywords standard located at http://gcmd.nasa.gov/learn/keyword_list.html.
Currently, the ECHO structure for Science Keywords matches the GCMD standard, however the Spatial Keywords do not. There is no published Temporal Keywords list managed by GCMD.Science Keywords

The science keyword metadata element fully implements the GCMD keyword hierarchy, which contains the following fields. There are no associated granule metadata elements for the science keyword.

- **Category** –. Keyword used to describe the general category of the dataset.
- **Topic** – Keyword used to describe the general topic of the dataset.
- **Term** – Keyword used to describe the science parameter area.
- **VariableLevel1** – Keyword containing the first level science keyword variable.
- **VariableLevel2** – Keyword containing the second level science keyword variable.
- **VariableLevel3** – Keyword containing the third level science keyword variable.
- **DetailedVariable**– Keyword containing a ree form field for further keyword specification.

Sample Science Keyword

```
<ScienceKeywords>
 <ScienceKeyword>
  <CategoryKeyword>EARTH SCIENCE</CategoryKeyword>
  <TopicKeyword>ATMOSPHERE</TopicKeyword>
  <TermKeyword>ATMOSPHERIC CHEMISTRY</TermKeyword>
  <VariableLevel1Keyword>
   <Value>OXYGEN COMPOUNDS</Value>
  </VariableLevel1Keyword>
 </ScienceKeyword>
</ScienceKeywords>
```

Spatial Keywords

The spatial keyword metadata element does not currently implement the updated GCMD keyword hierarchy. The ECHO spatial keyword contains a single value, which can be understood to be the Location' field in the GCMD managed list of keywords. There are no associated granule metadata elements for the science keyword.

Sample Spatial Keyword

```
<SpatialKeywords>
 <Keyword>GEOGRAPHIC REGION</Keyword>
</SpatialKeywords>
```

Temporal Keywords

The temporal keyword metadata element does not associated with a GCMD managed keyword list. The ECHO spatial keyword contains a single value. There are no associated granule metadata elements for the science keyword.

Sample Temporal Keyword

```
<TemporalKeywords>
 <Keyword>UTC</Keyword>
</TemporalKeywords>
```